II. Remarks

The Official Action of August 19, 2009 has been thoroughly studied. Accordingly, the changes presented herein for the application, considered together with the following remarks, are believed to be sufficient to place the application into condition for allowance.

By the present amendment the phrase "general formula" as been changed to "formula" in response to the rejection of claims 1-8 under 35 U.S.C. §112, second paragraph.

In addition, claims 6-8 have been changed to be dependent on claim 6.

Also, "polyfluoroalkylic" has been corrected to "polyfluoroalkylcarboxylic."

Entry of the changes to the claims is respectfully requested.

Claims 1-9 are pending in this application.

Claims 1-8 stand rejected under 35 U.S.C. §112, second paragraph.

Under this rejection the Examiner took the position that the term "general formula" was indefinite.

In response to this rejection the term "general formula" has been changed to "formula" by the present amendment.

Claims 1-4 and 6-8 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Weinmayr (JOC, 28, 492-4, 1963), JP 61-097277 to Yonosuke et al. ("Yonosuke '277") and JP 63-146868 to Yonosuke et al. ("Yonosuke '868").

For the reasons set forth below, it is submitted that each of the pending claims are allowable over the prior art of record and therefore, the outstanding rejection of the claims should properly be withdrawn.

Favorable reconsideration by the Examiner is earnestly solicited.

The Examiner has relied upon Weinmayr as teaching:

> ...a process for producing 2,2,3,3-tetrafluorooxethane by reacting fluoro-olefins with formaldehyde in hydrogen fluoride. Trifluoroethylene condenses with formaldehyde in liquid hydrogen fluoride to form 2,2,3,3-pentafluoro-l-propanol and fluoromethyl1-2,2,3,3,-pentafluoropropyl ether. See the entire document especially abstract, 1-32, and 1st column on page 493.

The Examiner has relied upon Yonosuke '277 as teaching 2,2,3,3-tetrafluorooxethane.

The Examiner has also relied upon Yonosuke '868 as teaching 2,2,3,3-tetrafluorooxethane.

The Examiner states that:

> Instant claims for process for producing 2,2,3,3-tetrafluorooxethanem has been generically taught by the reference.

The Examiner takes the position that:

> It would have been obvious ... to prepare 2.2,3,3-teuafluorooxethane by formaldehyde or its derivative and anhydrous hydrogen fluoride because prior art teaches this method. JP references also teach 2,2,3,3-tetrafluorooxethane (since there is criticality of invention has been disclosed in the specification examiner considered that claims are obvious over the prior art. Final decision will be made after considering the translation of JP REFERENCES. The reaction to prepare 2,2,3,3- tetrafluorooxethane and its derivatives has been taught by the reference.

Weinmayr teaches that the 2,2,3,3-tetrafluorooxethane is formed as a "minor by-product." In this regard, Weinmayr is concerned with forming 2,2,3,3,3-pentafluoro-l-propanol and fluoromethyl- 2,2,3,3,3-pentafluoropropylether.

On page 492, right hand column, lines 19-25, Weinmayr discloses that "small quantities of 2,2,3,3 [where 2,2,3,3,3 [must be a clerical error]-tetrafluorooxetane $CF_2CF_2CH_2O$, b.p. 28°C - are also formed."

Furthermore, on page 492, right hand column, lines 7-55, Weinmayr discloses that "Upon careful fractionation 300 g of 2,2,3,3-tetrafluorooxetane, b.p. 28°C, and .... were obtained;" however, due to the indefinite disclosure such as "Nine condensations made as described above

were combined ..." it is not possible to calculate the percentage yield of the 2,2,3,3-tetrafluorooxetane obtained by Weinmayr.

The Examiner had previously cited Weinmayr at "1-32 1st column on page 493." Applicants note that on page 493, left hand column, lines 1-32 that there is no disclosure of 2,2,3,3- tetrafluorooxetane.

On page 493, in the right band column under "Reaction of Tetrafluoroethylene with Formaldehyde," Weinmayr discloses"6 moles of formaldehyde is made to react with 3 moles of tetrafluoroethylene [TFE] in the presence of 600 g of HF to synthesize 429 (2.5 moles) of 2,2,3,3,3- pentafluoro-1-propanol in yield of 8.7% in terms of TFE, wherein 61 g (0.34 moles) of fluoromethyl- 2,2,3,3,3-pentafluoropropyl ether is obtained as a by-product in yield of 11.3% in terms of TFE; total yield being 96.0%."

This means that the reaction is mainly directed to formation of 2,2,3,3,3-pentafluoro-1-propanol, where 2,2,3,3-tetrafluorooxetance, when formed as a by-product, has a yield of 4.0% at the most.

In applicants' specification there is presented a Comparative Example that shows a process as disclosed by in JOC by Weinmayr where the yield of 2,2,3,3-tetarfluorooxethane was 18.8%. (See page 6 of applicants' specification)

In contrast, according to the present invention which is based upon the reaction in the presence of polyfluoroalkyl carboxylic acid or a polyfluoroalkyl ester, the yield of 2,2,3,3-tetrafluorooxethane is 35.3 to 39.3%, which is almost double as shown in the results of applicants' Examples 1-4.

It is submitted that applicants' claimed process for producing 2.2,3,3-tetrafluorooxethane (as a product as opposed to a minor by-product in the case of Weinmayr) is not at all taught or suggested by Weinmayr.

Applicants' process produces yields of 2,2,3,3-tetrafluorooxethane that are significantly greater than Weinmayr.

Accordingly, it would not have been obvious ..."to prepare 2,2,3,3-tetrafiuorooxethane, by formaldehyde or its derivative and anhydrous hydrogen fluoride" as the Examiner concludes. Rather, it is submitted that applicants' results are unexpected over the teachings of Weinmayr.

If anything, it would go against the teachings of Weinmayr to make or propose any modification that would increase the yield of by-products to the detriment of producing a greater desired product yield.

It is submitted that such an improper modification is tantamount to destroying or at least departing from the teachings of Weinmayr.

Yonosuke '277 and Yonosuke '868 are documents that were considered as category "A" reference in the International Search Report and thus are considered a "document defining the general state of the art which is not considered to be of particular relevance."

In this regard, Yonosuke '277 and Yonosuke '868 neither teach nor suggest a reaction that is carried out in the presence of polyfluorocarboxylic acid or polyfluoroalkyJ ester when tetrafluoroethylene is reacted with a compound that generates formaldehyde in anhydrous hydrogen fluoride to form 2,2,3,3-tetrafluorooxethane.

Therefore, the teachings of Yonosuke '277 and Yonosuke '868 are not actually relevant and do not cure the deficiencies of Weinmayr.

On page 7 of the Office Action with regard to Weinmayr the Examiner states:

> ...even if the compound is present in minor quantities the process of making would be obvious in absent of any criticality of the present invention.

Applicants' claims are directed to a process for producing 2,2,3,3-tetrafluorooxethane, which comprises allowing tetrafluoroethylene to react with paraformaldehyde (or trioxane) in

anhydrous hydrogen fluoride, said reaction being carried out in the presence of polyfluoroalkylcarboxylic acid or polyfluoroalkyl ester thereof: represented by the following formula:

RfCOORf'

wherein Rf is a polyfluoroalkyl group having 1-5 carbon atoms, and Rf' is a hydrogen atom or a polyfluoroalkyl group having 1-5 carbon atoms.

The difference of the 2,2,3,3-tetrafluorooxethane conversion (based upon yield) between applicants' working Examples (conversion of 35.2-39.3%) and applicants' Comparative Example (conversion of only 18.3&) is the use of a polyfluoroalkylcarboxylic acid or polyfluoroalkyl ester thereof (i.e., trifluoroacetic acid).

Thus applicants' claimed process which includes polyfluoroalkylcarboxylic acid or polyfluoroalkyl ester produces results that are clearly substantially improved and unexpected over processes like Weinmayr that do not include polyfluoroalkylcarboxylic acid or polyfluoroalkyl ester..

The fact that Weinmayr produces 2,2,3,3-tetrafluorooxetance at a yield of 4.0% is proof that Weinmayr flails to teach or suggest applicants' claimed invention.

Weinmayr does not teach reacting formaldehyde with fluoroolefins in the presence of a polyfluoroalkylcarboxylic acid or polyfluoroalkyl ester thereof represented by RfCOORf'.

Therefore, Weinmayr alone or in combination with either Yonosuke '277 or Yonosuke '868 does not render applicant's claimed process obvious.

Based upon the above distinctions between the prior art relied upon by the Examiner and the present invention, and the overall teachings of prior art, properly considered as a whole, it is respectfully submitted that the Examiner cannot rely upon the prior art as required under 35 U.S.C. §103 to establish a *prima facie* case of obviousness of applicants' claimed invention.

It is, therefore, submitted that any reliance upon prior art would be improper inasmuch as the prior art does not remotely anticipate, teach, suggest or render obvious the present invention.

It is submitted that the claims, as now amended, and the discussion contained herein clearly show that the claimed invention is novel and neither anticipated nor obvious over the teachings of the prior art and the outstanding rejection of the claims should hence be withdrawn.

Therefore, reconsideration and withdrawal of the outstanding rejection of the claims and an early allowance of the claims is believed to be in order.

Conclusion

It is believed that the above represents a complete response to the Official Action and reconsideration is requested.

If upon consideration of the above, the Examiner should feel that there remain outstanding issues in the present application that could be resolved; the Examiner is invited to contact applicants' patent counsel at the telephone number given below to discuss such issues.

To the extent necessary, a petition for an extension of time under 37 CFR §1.136 is hereby made. Please charge the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 23-1925 and please credit any excess fees to such deposit account.

Respectfully submitted,

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